



**[4910-13]**

**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 25**

**[Docket No. FAA-2013-0942; Special Conditions No. 25-515-SC]**

**Special Conditions:** Bombardier Aerospace Inc., Models BD-500-1A10 and BD-500-1A11 series airplanes; Autobraking System Loads

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions.

**SUMMARY:** These special conditions are issued for the Bombardier Aerospace Inc. Models BD-500-1A10 and BD-500-1A11 series airplanes. These airplanes will have novel or unusual design features associated with the autobraking system for use during landing. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**EFFECTIVE DATE:** [Insert date 30 days after date of publication in the Federal Register].

**FOR FURTHER INFORMATION CONTACT:** Mark Freisthler, FAA, Airframe and Cabin Safety Branch, ANM-115 Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98057-3356; telephone 425-227-1119; facsimile 425-227-1232.

## **SUPPLEMENTARY INFORMATION:**

### **Background**

On December 10, 2009, Bombardier Inc. applied for a type certificate for their new Models BD-500-1A10 and BD-500-1A1 series airplanes (hereafter collectively referred to as “C-series”). The C-series airplanes are swept-wing monoplanes with an aluminum alloy fuselage sized for 5-abreast seating. Passenger capacity is designated as 110 for the Model BD-500-1A10 and 125 for the Model BD-500-1A11. Maximum takeoff weight is 131,000 pounds for the Model BD-500-1A10 and 144,000 pounds for the Model BD-500-1A11.

### **Type Certification Basis**

Under the provisions of Title 14, Code of Federal Regulations (14 CFR) 21.17, Bombardier Inc. must show that the C-series airplanes meet the applicable provisions of part 25, as amended by Amendment 25-1 through 25-129.

If the Administrator finds that the applicable airworthiness regulations (i.e., 14 CFR part 25) do not contain adequate or appropriate safety standards for the C-series airplanes because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, the special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the C-series airplanes must comply with the fuel vent and exhaust emission requirements of 14 CFR

part 34 and the noise certification requirements of 14 CFR part 36, and the FAA must issue a finding of regulatory adequacy under section 611 of Public Law 92-574, the “Noise Control Act of 1972.”

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

### **Novel or Unusual Design Features**

The C-series airplanes will incorporate the following novel or unusual design features:

The C-series airplanes will have an autobrake system. This is a pilot-selectable function that allows earlier maximum braking at landing without pilot pedal input. When the autobrake system is armed before landing, it automatically commands maximum braking at main wheels touchdown. Normal procedures remain unchanged and call for manual braking after nose wheel touchdown.

### **Discussion**

Section 25.493 addresses braked roll loads but does not contain a specific “pitchover” requirement addressing the loading on the nose gear, the nose gear surrounding structure, and the forward fuselage. Moreover, § 25.493 specifies airplane attitudes in accordance with figure 6 of appendix A to part 25, which are level landing attitudes. For airplanes with traditional braking systems, the current ground load requirements are considered adequate for the design of the nose gear and airframe structure. However, the C-Series airplane autobrake system, which could apply maximum braking at the main wheels with the airplane in a tail-down attitude well before the nose touches down, will cause a high nose gear sink rate and potentially higher gear and airframe loads.

Part 25 does not contain adequate requirements to address the potentially higher structural loads that could result from this type of braking system. In addition, the effects on fatigue covered by § 25.571 also need to be considered. Therefore, FAA has determined that additional airworthiness standards are needed for the certification of this unusual design feature. These special conditions propose airworthiness standards for the certification of the C-series airplanes with an autobrake system.

### **Discussion of Comments**

Notice of proposed special conditions No. FAA-2013-0942 for the Bombardier C-series airplanes was published in the Federal Register on November 12, 2013 (78 FR 67321). No comments were received, and the special conditions are adopted as proposed.

### **Applicability**

As discussed above, these special conditions are applicable to the Models BD-500-1A10 and BD-500-1A11 series airplanes. Should Bombardier Inc. apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, the special conditions would apply to that model as well.

### **Conclusion**

This action affects only certain novel or unusual design features on one series of airplanes. It is not a rule of general applicability.

### **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The authority citation for these special conditions is as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for Bombardier Inc. Models BD-500-1A10 and BD-500-1A11 series airplanes.

Autobraking System Loads. A landing pitchover condition must be addressed that takes into account the effect of the autobrake system. The airplane is assumed to be at the design maximum landing weight, or at the maximum weight allowed with the autobrake system on. The airplane is assumed to land in a tail-down attitude at the speeds defined by § 25.481. Following main gear contact, the airplane is assumed to rotate about the main gear wheels at the highest pitch rate generated by the autobrake system. This is considered a limit load condition from which ultimate loads must also be determined. Loads must be determined for a critical fuel and payload distribution and centers of gravity. Nose gear loads, as well as airframe loads, must be determined. The airplane must support these loads as described in § 25.305.

In addition to the above airworthiness standards, fatigue loads must also be determined and applied in accordance to § 25.571.

Issued in Renton, Washington, on January 31, 2014.

John P. Piccola, Jr.  
Acting Manager, Transport Airplane Directorate  
Aircraft Certification Service

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